

## New species of *Eupithecia* (Lepidoptera, Geometridae) from China, part II

V. MIRONOV<sup>1)</sup>, A. C. GALSWORTHY<sup>2)</sup> and D. XUE<sup>3)</sup>

<sup>1)</sup> Zoological Institute RAN, Universitetskaja nab., 1, RU-199034, Saint Petersburg, Russia

<sup>2)</sup> The Natural History Museum, Cromwell Road, SW7 5BD, London, United Kingdom

<sup>3)</sup> Institute of Zoology, Chinese Academy of Sciences, 19 Zhongguanlu, Haidian, Beijing, 100080 China

**Abstract** 12 new species of *Eupithecia* (Lepidoptera, Geometridae) are described from China.

**Key words** Revision, *Eupithecia andrasi* sp. n., *Eupithecia levata* sp. n., *Eupithecia omissa* sp. n., *Eupithecia testacea* sp. n., *Eupithecia fenita* sp. n., *Eupithecia burselongata* sp. n., *Eupithecia minutula* sp. n., *Eupithecia hainanensis* sp. n., *Eupithecia molybdaena* sp. n., *Eupithecia lamata* sp. n., *Eupithecia mediocincta* sp. n. and *Eupithecia tepida* sp. n., taxonomy.

### Introduction

This is the second in a series of papers describing new species of Chinese *Eupithecia* from collections in Beijing, London and Bonn, the background to which was given in the first paper (Mironov *et al.*, 2004). In this paper we describe a further twelve new species (*E. andrasi* Mironov & Galsworthy, sp. n., *E. levata* Mironov & Galsworthy, sp. n., *E. omissa* Mironov & Galsworthy, sp. n., *E. testacea* Mironov & Galsworthy, sp. n., *E. fenita* Mironov & Galsworthy, sp. n., *E. burselongata* Mironov & Galsworthy, sp. n., *E. minutula* Mironov & Galsworthy, sp. n., *E. hainanensis* Mironov & Galsworthy, sp. n., *E. molybdaena* Mironov & Galsworthy, sp. n., *E. lamata* Mironov & Galsworthy, sp. n., *E. mediocincta* Mironov & Galsworthy, sp. n. and *E. tepida* Mironov & Galsworthy, sp. n.).

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Abbreviations. BMNH: Natural History Museum, London; ZCAS: Zoological Institute of the Chinese Academy of Sciences, Beijing; ZFMK: Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn.

### *Eupithecia andrasi* Mironov & Galsworthy, sp. nov. (Fig. 1)

**Description.** ♂. Wingspan 18 mm; fore wing 11 mm. Fore wing elongate, rather narrow; costa slightly bowed; termen almost straight; ground colour pale buff; discal dot small, round; antemedian line almost straight; postmedian moderately angled outwards close to costa, and then sharply inwards outside discal dot; area between these two lines speckled with darker brown scales, and probably forms darker median fascia in fresh specimens; terminal area slightly darker, with wavy, pale submarginal line. Fringes buff. Hind wing concolorous with fore wing, with scattered darker scales between anal margin and discal area.

**Male genitalia** (Fig. 13). Tip of uncus short and narrow, main part broadened and bulbous. Valve with costa curved towards apex, apex narrow and rounded, and ventral side with a

strong curved angle at centre, without ventral process. Vinculum short, narrow, tapered. Papillae on the anterior arms of labides small and thin. Aedeagus stout and short. Vesica armed with two large dentate cornuti, one elongate and one short irregular plate at ductus ejaculatorius base, and a patch of minute spines. Sternite A8 peg-like, with one pointed, sclerotized and slightly inclined apical rod; basal hollow medium size.

Female unknown.

Range. North west China: Shaanxi province.

Similar species. This species may possibly belong to the *russeliata* group, and, on the basis of structure of the male genitalia, is very closely similar to *E. vulgata* (Haworth, 1809). In particular, the shape of the uncus is identical, the vesica armature is very similar, the 8th sternite is close, and the valve shape is quite similar. The most readily appreciated distinction is in the shape of the 8th sternite, which in *andrasi* ends in a narrow, asymmetrically curved process, whereas in *vulgata* it is shorter, blunter and shallowly bilobed. On the external aspect, the shape of the postmedial in *vulgata* is identical to what can be seen of the postmedial in the holotype of *andrasi*.

Holotype. ♂, [China], Tapaishan im Tsinling, South Shensi [Dabaishan, Shaanxi], ca 3,000 m, 16. vi. 1936, H. Höne, Vojnits slide no 12375, "Holotypus of *Eupithecia caeca* Vojnits" (ZFMK).

Remarks. The holotype is worn, and markings are likely to be stronger in fresh specimens. This specimen was evidently prepared by Dr Andras Vojnits for description under the name "*Eupithecia caeca*", but never published. We have based the species name on Dr Vojnits' given name.

***Eupithecia levata* Mironov & Galsworthy, sp. nov. (Fig. 2)**

Description. ♂. Wingspan 20 mm; fore wing 13 mm. Fore wing: long, relatively narrow, costa well bowed; ground colour pale brown, with a reddish tinge along the costa, and more narrowly, the inner margin; antemedian line a broken brown line, regularly curved; discal dot dark brown, slightly elongate; median line strong at costa, sharply angled close to discal dot, then very faint to inner margin, with a sharp angle on the lower margin of the cell; postmedian also strong at costa, curving distad, then angled sharply at M<sub>1</sub>, much fainter over lower half of wing, reappearing close to inner margin; a pale fascia just visible distad of postmedian, following its line; terminal area somewhat darker, with a submarginal line of dark dots on the veins; terminal line brown, lighter on the veins. Fringes pale brown, unchequered. Hind wing: rather round; ground colour as fore wing; discal dot faint; area posterior to cell well irrorated with brown scales as far as tornus, vaguely organized into transverse lines; terminal line and fringes as fore wing.

Male genitalia (Fig. 14). Uncus long, biapical. Valve large, without ventral process; costa slightly curved concavely; apex narrow; saccus slightly expanded and sclerotized. Vinculum short and broad. Papillae on anterior arms of labides large, relatively thick. Aedeagus broad and short. Vesica armed with two stout horn-like cornuti (one straight and the other shorter and curved, claw-like), one elongate plate, one large irregular and curved plate near base of ductus ejaculatorius, and an elongate patch of very small spines. Sternite A8 elongate, triangular, with two short and broad, heavily sclerotized apical rods; basal hollow deep; apical hollow shallow and narrow.

Female unknown.

Range. South west China: Yunnan province.

Similar species. This species belongs to the *millefoliata* group. The male genitalia are similar to those of the Mediterranean species *Eupithecia pauxillaria* Boisduval, 1840 (= *euphrasiata* Herrich-Schäffer, 1861), but can be distinguished by the longer uncus, the more sclerotized sacculus, and the much longer horn-like cornuti on the vesica. The shape of sternite A8 of the male is almost triangular in *levata*, but gradually tapered in *pauxillaria*.

Holotype. ♂, [China], North Yunnan, Likiang [Lijiang], 30. iii. 1935, H. Höne, De Laever slide no 349 (ZFMK).

Remarks. The single specimen is worn.

***Eupithecia omissa* Mironov & Galsworthy, sp. nov. (Fig. 3)**

Description. Wingspan 18–20 mm; fore wing 10–11 mm. Fore wing triangular, costa slightly bowed, accentuated towards apex; tornus curving gradually; ground colour mid brown, transverse lines pale brown; basal line curved, most strongly marked at costa; antemedian double, sharply angled in cell; discal dot dark brown, slightly elongate; two weakly marked postmedian lines, sharply angled close to the costa, paralleled distad by a strongly marked broad pale line; terminal line brown, interrupted on veins. Fringes chequered brown and cream. Hind wing ground colour white, dotted throughout with brown scales, most strongly towards the outer margin and on the anal margin, where brown scales are concentrated in discrete patches, representing the beginnings of transverse lines; discal dot small, but well marked; terminal line brown.

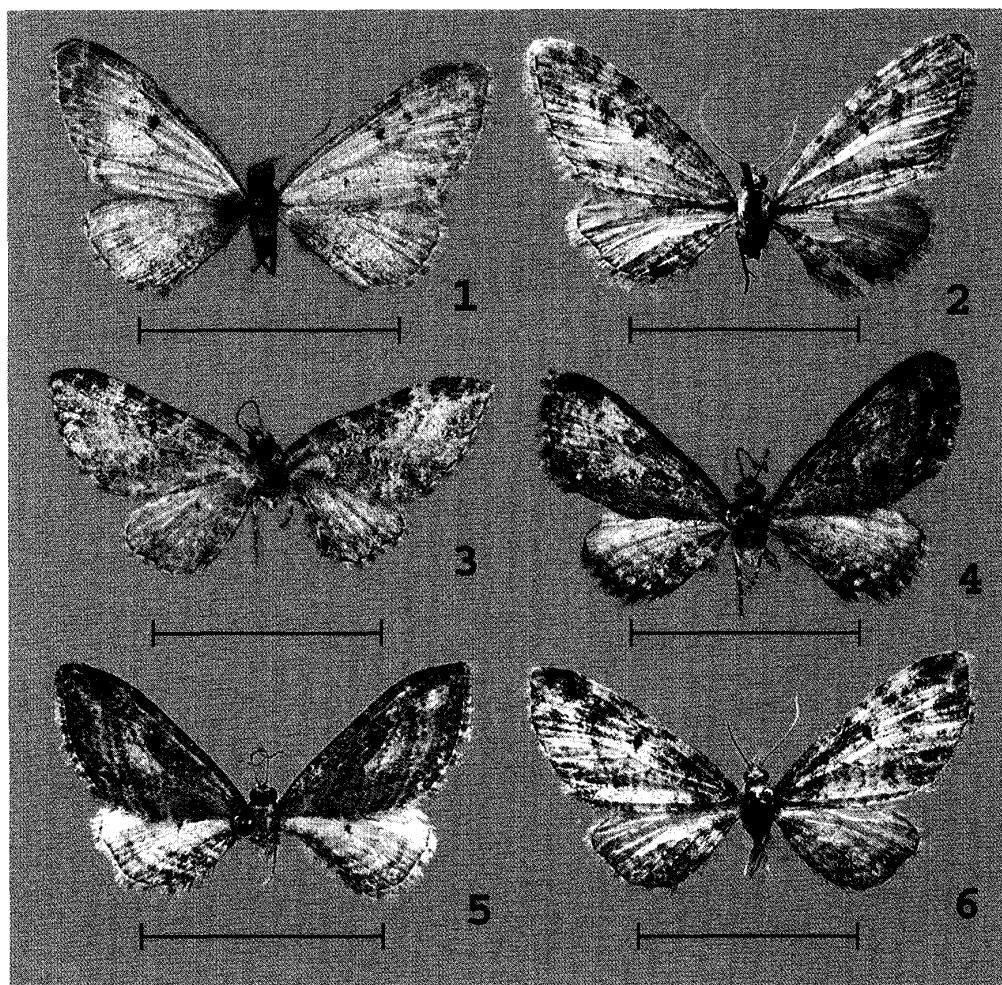
Male genitalia (Fig. 15). Surviving portions of valve of only known male show a wide and blunt, heavily sclerotized projection near base. Vinculum rather elongate and narrow, with shallow medial hollow. Papillae on anterior arms of labides large, slightly elongate and thick. Aedeagus large, long and stout. Vesica armed with three broad, stout horn-like cornuti (two apical and one medial), one long tubulate cornutus, one large irregular plate near ductus ejaculatorius base and an elongate patch of microspines. Sternite A8 large and broad, triangular, with two small, heavily sclerotized apical rods and heavily sclerotized margins near apex; basal hollow deep; apical hollow shallow.

Female genitalia (Fig. 19). Bursa copulatrix an elongated oval shape, covered with large uniform spines on the right side and base. Ductus bursae broad and partly corrugated, with a separate patch of smaller spines. Ductus seminalis broadly attached to corpus bursae near base. Colliculum relatively elongate and broad, slightly inclined to left. Antrum membranous. Tergite A8 elongated. Anterior and posterior apophyses of medium size, tapered. Papillae anales small and narrow, tapered and covered with long setae.

Range. North west China: Shaanxi and Gansu provinces.

Similar species. This species also belongs to the *millefoliata* group. The male genitalia are similar to those of the Mediterranean *Eupithecia weissii* Prout, 1938 and *E. pauxillaria* Boisduval, 1840, but are readily distinguished by the shape of the valves, the cornuti on the vesica and the 8th sternite. The female genitalia are rather similar to those of the West-Mediterranean *E. santolinata* Mabille, 1871, but the separate patch of small spines in the ductus bursae, the absence of striation on the base of the ductus seminalis, the colliculum inclining to the left, the elongated 8th tergite and the elongated, narrow and tapered papillae anales covered with long setae are distinctive.

Holotype. ♀, [China], Shaanxi, Ningshan Huoditan, 1,580 m, 2. vii. 1999, coll. Yuan



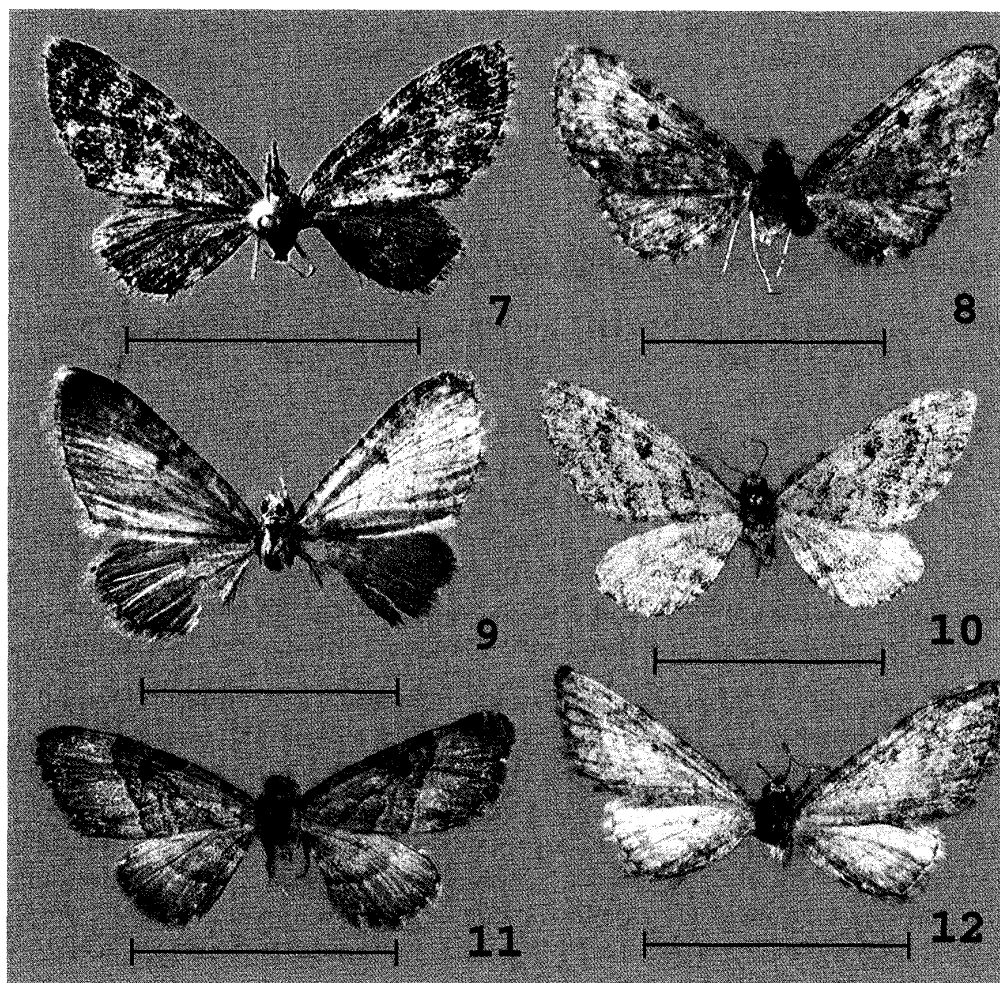
Figs 1-6. *Eupithecia* adults. 1. *E. andrasi* sp. nov. 2. *E. levata* sp. nov. 3. *E. omissa* sp. nov. 4. *E. testacea* sp. nov. 5. *E. fenita* sp. nov. 6. *E. burselongata* sp. nov.

Decheng, ZCAS slide no L-3081 (ZCAS). Paratypes. 1 ♂, [China], Gansu, Wenxian, Qiujiaba, 2,350 m, 28. vi. 1988, coll. Yao Jian, slide no L-3082. 1 ♀, [China], Shaanxi, Foping, 1,750 m, 28. vi. 1999, coll. Yao Jian, slide no L-3080 (ZCAS).

Remarks. The genitalia of the only male are damaged: the uncus, tegumen, labides, and apices of both valves are absent. The tips of the basal rods of the 8th sternite are also damaged.

***Eupithecia testacea* Mironov & Galsworthy, sp. nov. (Fig. 4)**

Description. ♂. Wingspan 18 mm; fore wing 12 mm. Costa slightly bowed, apex rounded; termen and inner margin a continuous curve; ground colour pale brown, becoming chestnut with a slightly orange tinge on distal part of wing along inner margin, and in an ill defined small area below and distad of the discal spot; a double inner line faintly visible, angled close to the costa, and running basad to the inner margin; discal dot dark brown, slightly elongate; postmedian line doubly angled close to costa, bordered externally by a narrow pale fascia; terminal area slightly darker, crossed by a wavy pale subterminal line; terminal line dark brown. Fringes chequered pale and dark brown. Hind wing much shorter than fore wing, rounded; ground colour brownish white, suffused with darker brown in anal area;



Figs 7–12. *Eupithecia* adults. 7. *E. minutula* sp. nov. 8. *E. hainanensis* sp. nov. 9. *E. molybdaena* sp. nov. 10. *E. lamata* sp. nov. 11. *E. mediocincta* sp. nov. 12. *E. tepida* sp. nov.

tiny and faint discal dot; a line of 3–4 pale subterminal spots close to tornus; terminal line and fringes as fore wing.

Male genitalia (Fig. 16). Uncus short and stout, but sharply pointed, almost triangular. Valve rather large and elongate, with a straight costa, a large, heavily sclerotized, wide and blunt ventral process near the base of the valve, and a smaller blunt ventral process at the centre of the ventral margin of the valve. Vinculum with shallow medial hollow. Papillae on anterior arms of labides narrow and elongate. Aedeagus stout, short and thick. Vesica armed with two relatively short and thick horn-like cornuti with blunt tips (one hook-like and the other straight), one large, wide, slightly bowed U-shaped plate, and a smaller irregular plate near base of ductus ejaculatorius. Sternite A8 elongate, with two sclerotized, parallel apical rods with rounded tips; basal hollow moderate; apical hollow very deep, membranous.

Female unknown.

Range. Southwest China: Yunnan province.

Similar species. On the basis of the structure of the male genitalia, this species belongs to the *inepta* species-group introduced by Vojnits (1984). The cornuti on the vesica in the new species differ in shape from allied Chinese species, such as *Eupithecia inepta* Vojnits, 1979,

*E. mentita* Vojnits, 1984, *E. placida* Vojnits, 1984, *E. laudabilis* Vojnits, 1984, *E. caduca* Vojnits, 1984, and also from *E. persuastrix* Mironov, 1990 from Primorje (Russian Far East).

Holotype. ♂, [China], North Yunnan, 19. viii. 1934, H. Höne, De Laever slide no 131 (ZFMK). Paratype. 1 ♂, [China], North Yunnan, Likiang [Lijiang], 19. viii. 1934, H. Höne, De Laever slide no 354 (ZFMK).

***Eupithecia fenita* Mironov & Galsworthy, sp. nov. (Fig. 5)**

Description. Wingspan 17 mm; fore wing 11 mm. Fore wing elongate; costa well bowed, especially towards apex, which is relatively sharp; termen evenly rounded to tornus; ground colour pale brown; basal part of wing as far as postmedian without transverse lines, but irrorated with darker brown scales, especially in discal area; discal dot dark brown, large and elongate; postmedian a thick dark brown line, angled close to the costa, paralleled distad by a second narrower line; terminal area darker, crossed by faintly visible wavy white submarginal; terminal line brown, not well marked. Fringes brown. Hind wing buffy white, contrasting with fore wing, with well marked discal dot; anal margin with all transverse lines well marked, but terminating abruptly at disc, except for double postmedian, which continues faintly towards costa; terminal area pale brown; terminal line darker brown; fringes brown.

Male genitalia (Fig. 17). Uncus short and stout, biapical. Valve rather large and elongate, with straight costa and heavily sclerotized sacculus, and a small and blunt medial process at ventral margin. Vinculum short and narrow, trapezoid, with shallow medial hollow. Papillae on anterior arms of labides rather elongate and thin. Aedeagus large and stout. Vesica armed with three short, slightly curved horn-like cornuti (two apical and one placed near ductus ejaculatorius base), one thin, broad, bowed U-shaped plate, one large irregular plate at ductus ejaculatorius base, and an elongate patch of minute spines. Sternite A8 elongate, rather narrow, with two sclerotized and blunt, parallel apical rods; basal hollow shallow; apical hollow very deep, narrow, membranous.

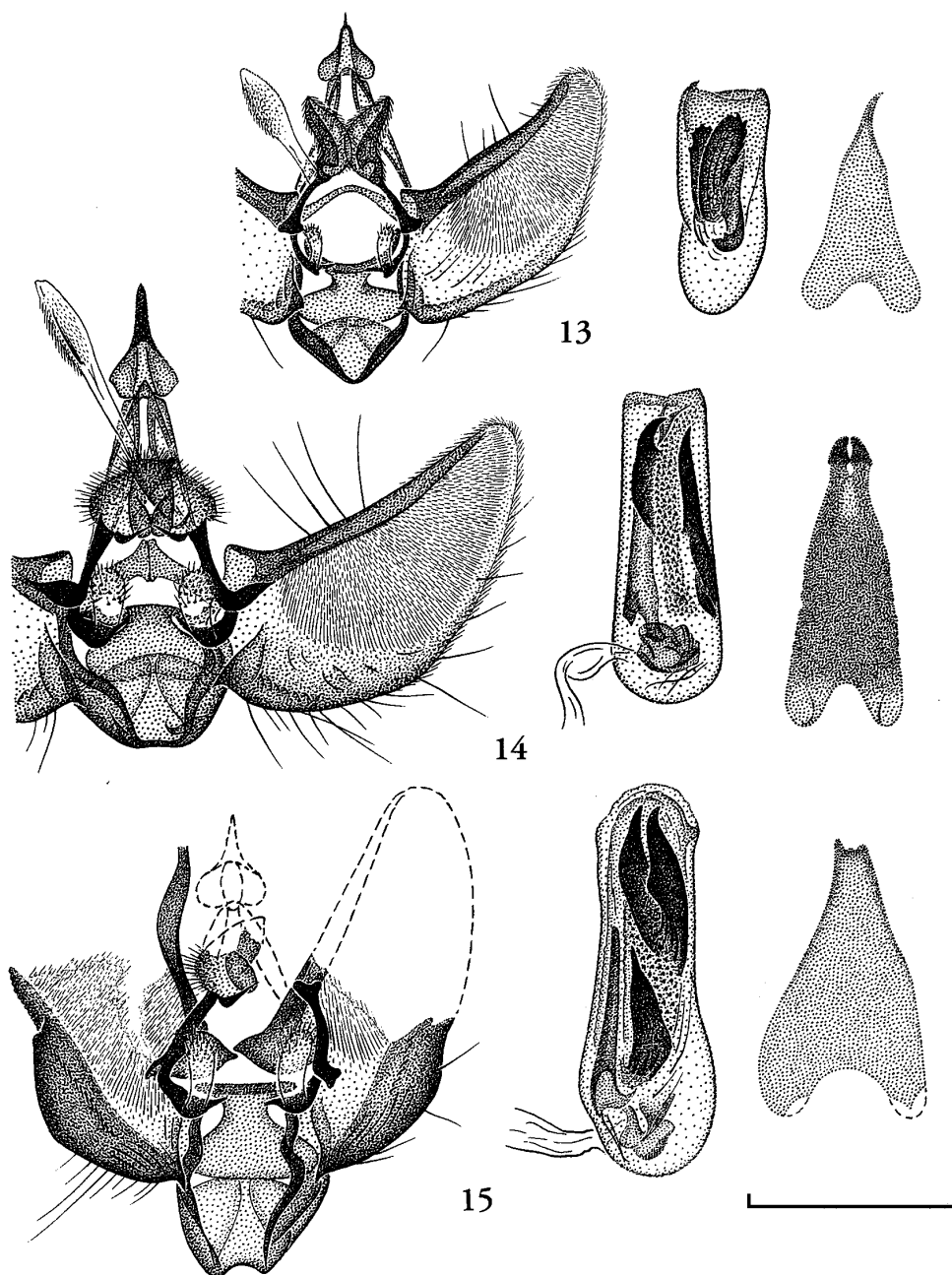
Female genitalia (Fig. 20). Bursa copulatrix pear-shaped, covered with spines over approximately half its surface; on the left side a short row of large, elongate spines. Ductus bursae with longitudinal striations and a large patch of minute spines. Ductus seminalis broadened at base, attached to ductus bursae from right side. Colliculum collar-like, medium size. Antrum membranous. Tergite A8 trapezoid. Anterior and posterior apophyses rather short and thin; posterior apophyses expanded at the tips. Papillae anales short and narrow.

Range. South west China: Yunnan province.

Similar species. Like the preceding species, this species belongs to the *inepta* group. It can be distinguished from allied species by the shape of the cornuti on the vesica. The female genitalia are similar to those of *Eupithecia inepta* Vojnits, 1979, *E. placida* Vojnits, 1984, *E. laudabilis* Vojnits, 1984 and *E. caduca* Vojnits, 1984.

Holotype. ♂, [China], North Yunnan, A-tun-tse [Deqing], 4,500 m, 14. vii. 1937, H. Höne, Vojnits slide no 14066 ("Paratypus of *Eupithecia subplacida* Vojnits") (ZFMK). Paratypes. 12 ♂ 6 ♀ in all: 2 ♂ 2 ♀, [China], North Yunnan, A-tun-tse, Upper heights (ca 4,500 m), 23. vii. 1936, 21. viii. 1936, 24. vii. 1936 and 22. viii. 1936, H. Höne, Vojnits slides respectively nos 14092, 14111, 13957 and 14098, all labelled "Paratypus of *Eupithecia placida* Vojnits"); 1 ♂, same locality, 10. viii. 1936, H. Höne, Vojnits slide no 13748 (labeled "Paratypus of *Eupithecia subplacida* Vojnits"); 2 ♂ 1 ♀, same locality, 17. vii. 1936, 12. viii. 1936, and 7. vii. 1936, H. Höne, Vojnits slide no 12482, de Laever slide no 78, and Vojnits slide no 12490; 1 ♀, same locality, Talsohle, ca 3,500 m, 11. vii. 1935, H. Höne, Vojnits slide no 12172; 1

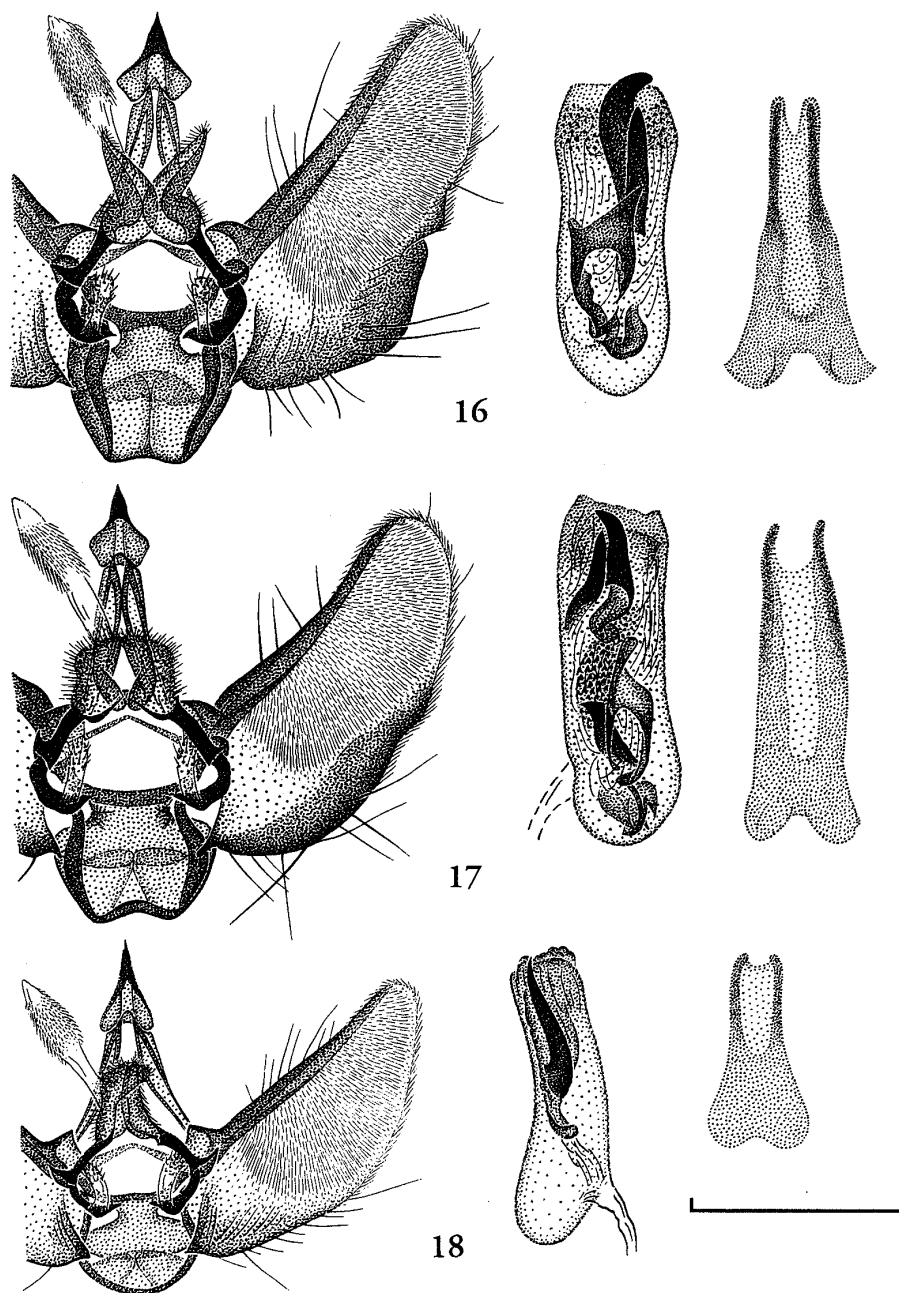




Figs 13–15. Male genitalia of *Eupithecia* species (scale bar=1 mm; with sternite A8). 13. *E. andrasi* sp. nov. 14. *E. levata* sp. nov. 15. *E. omissa* sp. nov.

♀, same locality, Middle heights, (ca 4,000 m), Vojnits slide no 13291; 2 ♂, Li-kiang [Lijiang], North Yunnan, 2,800 m, 19. viii. 1934 and 15. viii. 1935, H. Höne, Vojnits slides nos 13345 and 13353 (labeled “Paratypus of *Eupithecia subplacida* Vojnits”); 5 ♂ 1 ♀, same locality, 17. viii. 1934, 10. viii. 1935, 14. viii. 1935, 28. viii. 1935, 4. viii. 1935, and 9. ix. 1935, H. Höne, respectively De Laever slides nos 135, 286, 314, and 137, Mironov slide no 510, and Vojnits slide no 12532 (all ZFMK);

Remarks. Some of the males of this species were described by Vojnits (1984) as paratypes of *Eupithecia placida* Vojnits, and some as paratypes of *E. subplacida* Vojnits. The females



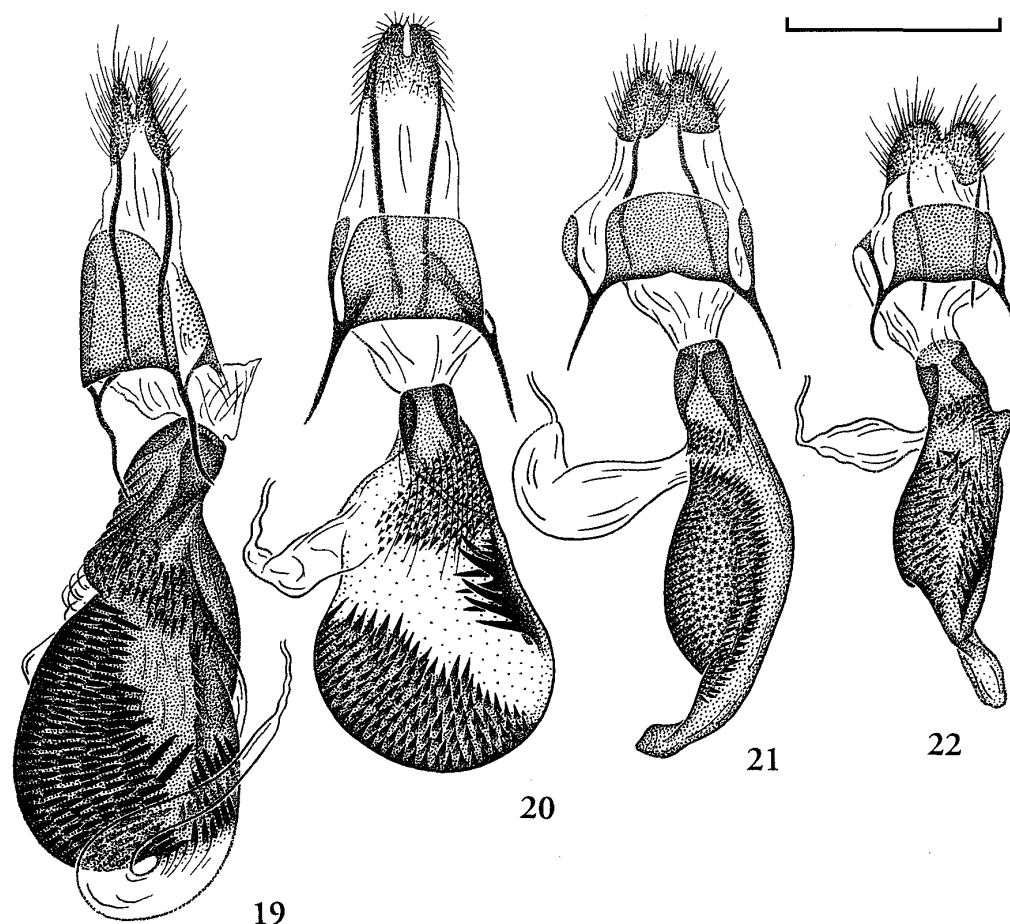
Figs 16–18. Male genitalia of *Eupithecia* species (scale bar=1 mm; with sternite A8). 16. *E. testacea* sp. nov. 17. *E. fenita* sp. nov. 18. *E. burselongata* sp. nov.

were all described as paratypes of *Eupithecia placida* Vojnits. However, the males are not conspecific with the holotype males of *placida* or *subplacida*, having, among other things, different ornamentation in the vesica. Careful examination of the whole type series of these and closely related species has established that different females belong with the holotype males.

***Eupithecia burselongata* Mironov & Galsworthy, sp. nov. (Fig. 6)**

Description. Wingspan 18–22 mm; fore wing 11–12 mm. Fore wing slightly elongate, costa a





Figs 19–22. Female genitalia of *Eupithecia* species (scale bar=1 mm). 19. *E. omissa* sp. nov. 20. *E. fenita* sp. nov. 21. *E. burselongata* sp. nov. 22. *E. minutula* sp. nov.

little bowed, termen and inner margin almost continually curved: ground colour very pale buff; basal area brown, the brown area angled on anterior edge of cell, a brown suffusion continuing on the costa to about half; antemedian and median lines just visible as two undulating pale brown lines below the discal spot, which is dark brown and slightly elongated; postmedian consisting of two narrow pale brown lines following the contour of the termen, and curving gradually to meet the costa at right angles; an irregular darker brown suffusion is present on both sides of the postmedian, most marked near the costa; terminal area irregularly suffused with darker brown blotches; terminal line dark brown. Fringes buff, unchequered. Hind wing short in comparison with fore wing; ground colour dingy white; discal dot varying from absent to small; anal margin darkened to mid brown as far as lower margin of cell; a faint pale brown postmedian just visible.

Male genitalia (Fig. 18). Uncus rather elongated, biapical. Valve shaped like an orange segment, with straight costa, narrow apex and without ventral process. Vinculum short and narrow. Papillae on anterior arms of labides thin and elongate. Aedeagus slim, shorter than valve length. Vesica armed with one, slightly sinuate horn-like cornutus and one small, curved plate near base of ductus ejaculatorius. Sternite A8 with two narrow, parallel apical rods with blunt tips; basal hollow very shallow; apical hollow membranous, deep, over half length of sternite.

Female genitalia (Fig. 21). Bursa copulatrix fusiform, sclerotized, covered with small spines

on right side; a small membranous diverticulum near base. Ductus bursae short with separate small patch of minute spines. Ductus seminalis broadened at base, attached to ductus bursae near colliculum. Colliculum collar-like, relatively large, elongate and wide. Antrum membranous. Tergite A8 small, nearly quadrate. Anterior and posterior apophyses short and thin. Papillae anales small, short and narrow.

Range. South west China: Yunnan province.

Similar species. This species belongs to the *undata* group, and is externally rather similar to *Eupithecia consortaria* Leech, 1897. In the male, the combination of the slim biapical uncus, the relatively elongate and narrow valve, the short and narrow vinculum, the single medium-sized horn-like cornutus on the vesica, the shape of sternite A8 in the male distinguish it from other members of the group. In the female, the fusiform bursa copulatrix with a solid diverticulum at its base, the disposition of small spines in the corpus bursae, and the elongate and relatively broad colliculum are distinctive.

Holotype. ♀, [China], A-tun tse [Deqing], North Yunnan, upper heights, ca 4,500 m, 31. vii. 1936, H. Höne, De Laever slide no 86 (ZFMK). Paratypes. 1 ♂, locality as holotype, 11. viii. 1936, H. Höne, Vojnits slide no 12491 (ZFMK); 1 ♀, locality as holotype but "middle heights", ca 4,000 m, 18. viii. 1936, H. Höne, Vojnits slide no 12497 (ZFMK).

Remarks. All specimens are relatively worn.

***Eupithecia minutula* Mironov & Galsworthy, sp. nov. (Fig. 7)**

Description. ♀. Wingspan 14–17 mm; fore wing 10 mm. Fore wing narrow, triangular, costa bowed, termen and inner margin curving continuously; ground colour dark brown, transverse lines paler brown; basal half of wing unmarked; discal dot small, a little darker than ground colour; a pale median line, distally close to the discal spot, and angled around it; postmedian pale, curved parallel to termen; subterminal and terminal lines absent. Fringes chequered dark and pale brown. Hind wing: evenly dark brown as fore wing, slightly darker along anal margin.

Female genitalia (Fig. 22). Bursa copulatrix fusiform, sclerotized, covered with an irregular pattern of small spines, with a short row of larger spines and a small membranous diverticulum near the base. Ductus bursae short, with a separate patch of minute spines and a small sclerotized bulla. Ductus seminalis broadened at base, attached to ductus bursae near colliculum. Colliculum collar-like, relatively large, elongate and wide. Antrum membranous. Tergite A8 small, nearly quadrate. Anterior and posterior apophyses short and thin. Papillae anales relatively large, short but broad.

Male unknown.

Range. South west China: Yunnan and Tibet.

Similar species. Like the preceding species, this species belongs to the *undata* group. It is similar to the Siberian *Eupithecia leptogrammata* Staudinger, 1882 and could be confused with it. It can be distinguished by the smaller size, the larger discal spot on the fore wing and the presence of a shallow medial hollow on the terminal margin of the hind wing. The female genitalia are similar to those of *E. burselongata* sp. n., but distinguished from it by the presence of a short row of larger spines near the base of the bursa copulatrix.

Holotype. ♀, [China], Li-kiang [Lijiang], North Yunnan, 25. vi. 1935, H. Höne, De Laever slide 153 (ZFMK). Paratype. 1 ♀, [China], Linzhi, Bayi, Tibet, 3,040 m, 2–3. vii. 2002,

Han Hongxiang, ZCAS slide no L-3145 (ZCAS).

***Eupithecia hainanensis* Mironov & Galsworthy, sp. nov. (Fig. 8)**

Description. Wingspan 18–22 mm; fore wing 11–12 mm. Fore wing broad, costa slightly bowed; ground colour pale brown; antemedian and basal lines present only as darker shading near costa; discal spot dark brown, slightly elongate; postmedian a broad dark brown line, parallel to the termen, evenly curved outside discal dot; wavy white submarginal line faintly visible, terminating in a well-marked white tornal spot; terminal line darker brown, not well marked. Fringes brown. Hind wing concolorous with fore wing; a well marked, quite large discal dot; anal margin suffused with darker scales, grouped to form the beginnings of transverse lines; a faint wavy white submarginal line, and a large white tornal spot; terminal line and fringes as fore wing.

Male genitalia (Fig. 23). Uncus large and stout, possibly biapical. Valve large, broad, with wide and blunt apex; sacculus heavily sclerotized with asymmetrical ventral process (pointed on the right valve and more or less blunt on the left valve). Juxta very short and wide. Vinculum short and broad. Papillae on the anterior arms of labides long and thin. Aedeagus large, but rather slim. Vesica armed with one elongate, thin, horn-like cornutus and one very small irregular plate near ductus ejaculatorius base. Sternite A8 large, long, broadened at base and at apex, with two wide but pointed, sclerotized, pincer-like apical lobes; basal hollow deep; apical hollow relatively shallow.

Female genitalia (Fig. 26). Bursa copulatrix almost spherical, completely covered with small spines. Ductus bursae very long, rather broad, membranous, without spines. Ductus seminalis slightly broadened near base, attached to median part of ductus bursae. There is a short and bowed blind gut between ductus bursae and antrum. Antrum very large, long and wide, funnel-shaped, heavily sclerotized. Tergite A8 spade-shaped. Anterior and posterior apophyses thin, medium size, tapered. Papillae anales rather short, covered with long setae.

Range. Hainan Island.

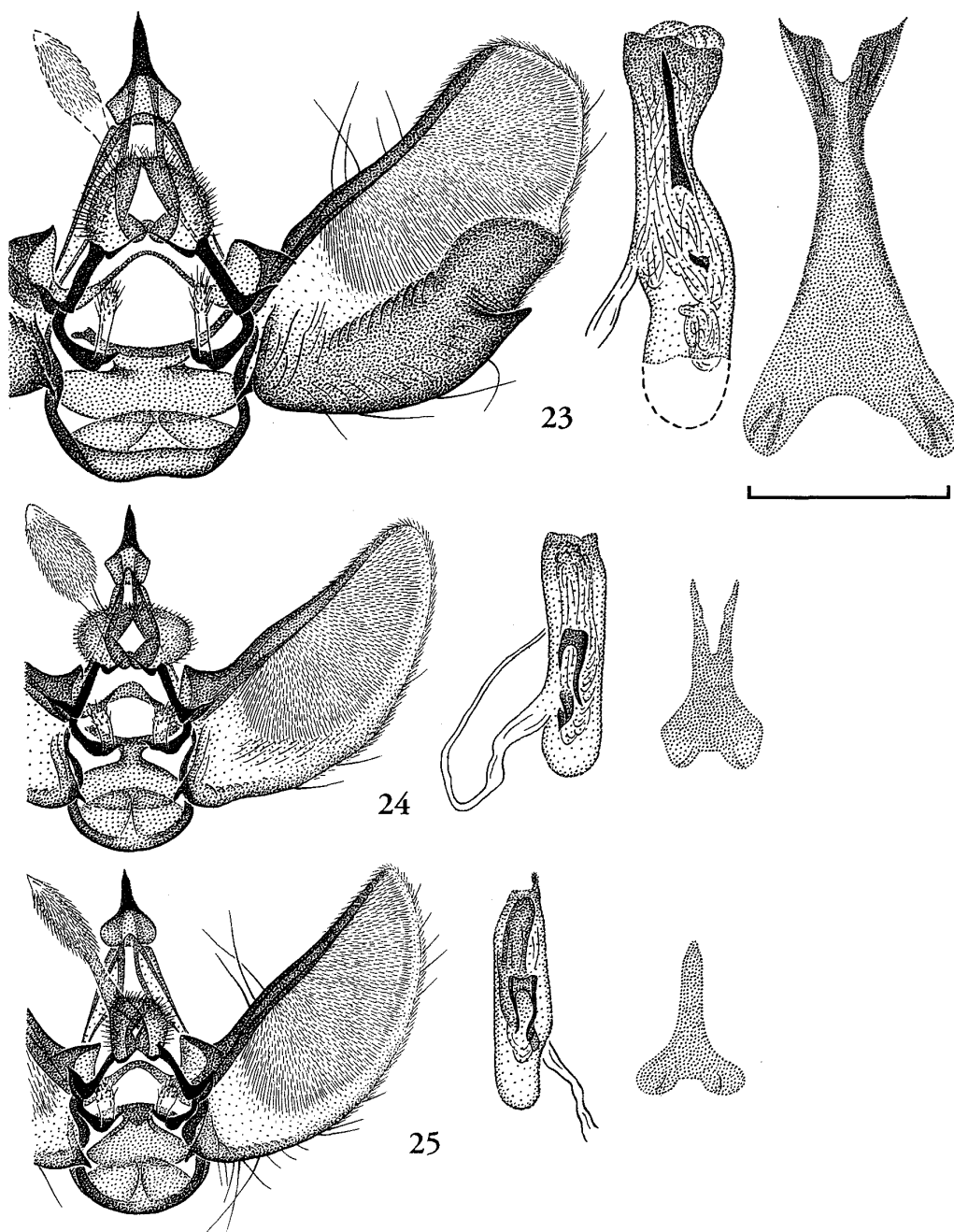
Similar species. On the basis of the structure of the male genitalia, this species may belong to the *egenaria* group. The shape of sternite A8 of the male is similar to that of *Eupithecia selinata* Herrich-Schäffer, 1861 and *E. groenblomi* Urbahn, 1969 (= *tsushimensis* Inoue, 1980), but larger, with broader apical rods. The wide valve with broad and blunt apex, heavily sclerotized sacculus with ventral process, and one slim horn-like cornutus on the vesica distinguish the species from both of those named above. The female genitalia are also distinctive.

Holotype. ♂, [China], Hainan, Jianfengling, 21. xii. 1983, coll. Liu Yuanfu, slide no L-2554 (ZCAS). Paratypes. 2 ♀, data as holotype, slides nos L-2555 and L-3147 (ZCAS).

Remarks. The anterior end and posterior tip of the aedeagus tube in the genitalia preparation of the only male specimen are missing.

***Eupithecia molybdaena* Mironov & Galsworthy, sp. nov. (Fig. 9)**

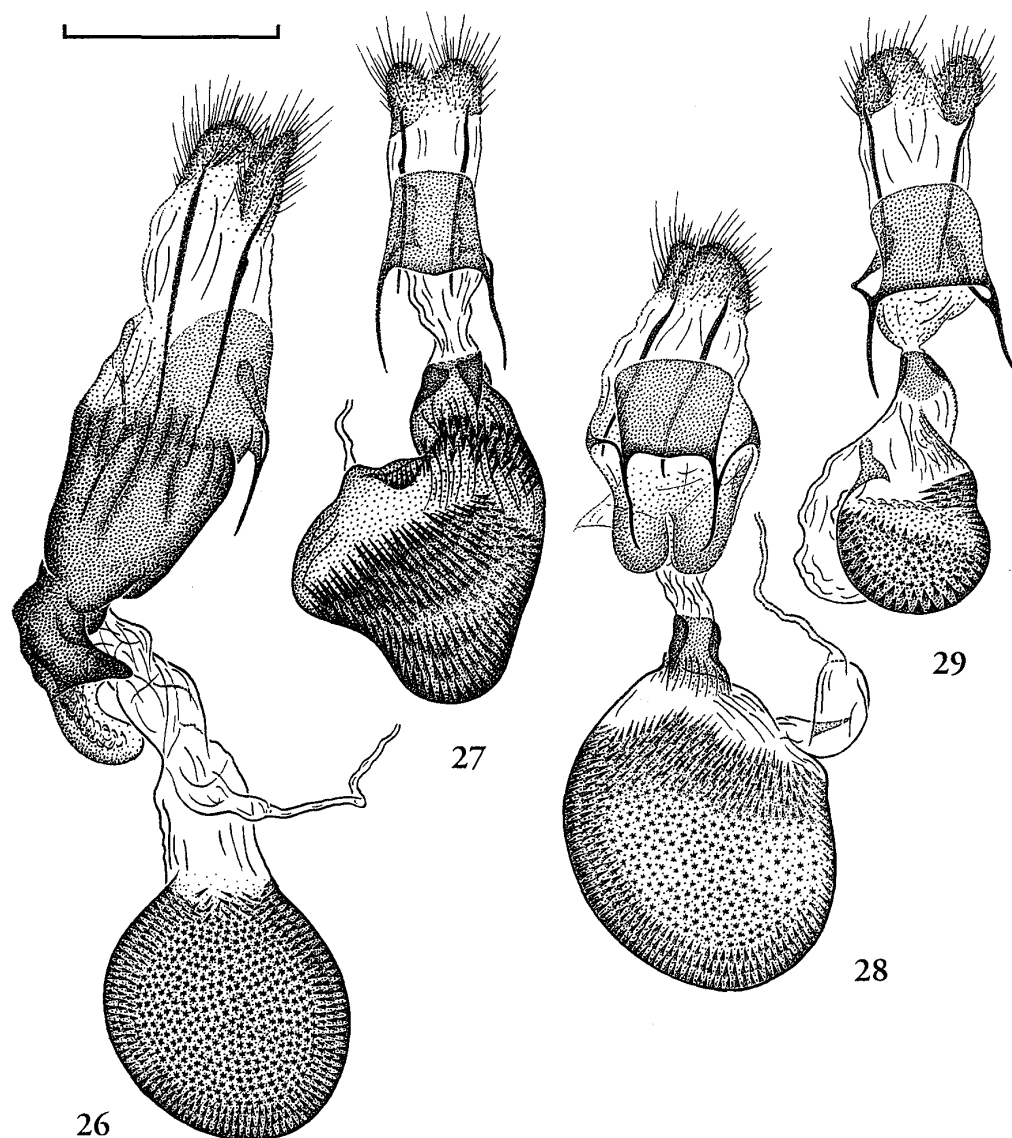
Description. ♀. Wingspan 17 mm; fore wing 10 mm. Fore wing: virtually an isosceles triangle; costa almost straight, termen and inner margin relatively straight; ground colour pale brown, rather uniform; transverse lines reduced, for the most part visible only at costa as short brown streaks, one at the antemedian, two at the median, and one at the postmedian; postmedian just visible as a curved line parallel to termen, without angle; discal dot small,



Figs 23–25. Female genitalia of *Eupithecia* species (scale bar=1 mm). 23. *E. hainanensis* sp. nov.  
24. *E. mediocincta* sp. nov. 25. *E. tepida* sp. nov.

dark brown; terminal line brown. Hind wing: quite long in proportion to fore wing; ground colour uniform with fore wing; discal dot faintly visible; otherwise unmarked.

Female genitalia (Fig. 27). Bursa copulatrix elongate, sclerotized, with prominent broad sclerotized diverticulum from right side, covered with large spines over approximately the anterior half. Ductus bursae with a discrete patch of spines and longitudinal striations. Ductus seminalis short and narrow, attached to corpus bursae from right side. Colliculum collar-like, short but relatively broad. Tergite A8 slightly elongate. Anterior and posterior apophyses medium length and thin. Papillae anales short, rounded.



Figs 26–29. Female genitalia of *Eupithecia* species (scale bar=1 mm). 26. *E. hainanensis* sp. nov.  
27. *E. molybdaena* sp. nov. 28. *E. lamata* sp. nov. 29. *E. mediocincta* sp. nov.

Male unknown.

Range. Western China: Shaanxi province.

Similar species. This species belongs to the *gueneata* group, and is similar to the Euro-Siberian *Eupithecia trisignaria* Herrich-Schäffer, 1848. The female genitalia are very similar to those of *E. trisignaria* but the spines, especially the marginal spines in the corpus bursae, are larger than in the compared species, and the patch of spines in the ductus bursae is separated from those in the bursa copulatrix.

Holotype. ♀, [China], Tapaishan im Tsinling [Dabaishan, Qinling mts], South Shaanxi, ca 1,700 m, 9. viii. 1936, H. Höne, Vojnits slide no 12382, "*Eupithecia finitima* Vojnits" (ZFMK).

Remarks. The unique holotype is rather worn: it was determined by Vojnits as a female of

*Eupithecia finitima* Vojnits, 1979. The latter was based on a male holotype, with a female paratype. We have not been able to locate the paratype, but external comparison of the present specimen with the male holotype of *finitima* shows substantial differences both in patterning and wing shape, indicating that they are not conspecific. In particular, *finitima* has the fore wing costa completely bowed and the tornal angle a smooth curve without a clear angle. The genitalia of *molybdaena* are similar to, though not quite identical with, Vojnits' illustration of the female genitalia of *finitima*. The paratype female of *finitima* may therefore not be correctly determined as *finitima*, but resolution of this must await examination of the specimen itself.

***Eupithecia lamata* Mironov & Galsworthy, sp. nov. (Fig. 10)**

**Description.** ♀. Wingspan 19 mm; fore wing 11 mm. Fore wing slightly elongate, costa bowed, the wing forming an isosceles triangle; ground colour pale brown buff, transverse lines in dark brown; antemedian leaving costa at right angle, sharply angled at front of cell, then continuing straight to join inner margin at oblique angle; discal dot dark brown, elongate; median line passing through discal dot, approximately parallel to antemedian, though slightly sinuate below discal dot; postmedian triple, the centre line heavier and darker than the other two, all three angled near costa, and slightly crenellate; terminal area darker brown; terminal line brown, interrupted at veins. Fringes buff-brown, unchequered, but consisting of scales with alternate brown and white bands. Hind wing elongate, ground colour as fore wing; discal dot large but faint; antemedian and postmedian lines complete, mostly parallel to termen but angled close to anal margin; terminal line and fringes as fore wing.

**Female genitalia** (Fig. 28). Bursa copulatrix ovate, almost completely covered with numerous small spines except for the quarter immediately adjacent to the colliculum; marginal spines longer. Ductus bursae very short, with short longitudinal striations. Ductus seminalis broadened at base, attached to corpus bursae near colliculum. Colliculum collar-like, rather short and narrow. Antrum funnel-shaped, slightly sclerotized. Tergite A8 almost square. Anterior and posterior apophyses thin, tapered, rather short. Papillae anales medium-sized, rounded.

Male unknown.

**Range.** Western China: Qinghai province.

**Similar species.** On the basis of the structure of the female genitalia, especially the combination of the shape of bursa copulatrix, the area covered by spines with longer marginal spines, and the sclerotized antrum, this species appears likely to belong to the *graphata* or *breviculata* species-groups. The antrum particularly is reminiscent of the West Mediterranean *E. cooptata* Dietze in the *graphata* group, from which it differs in the lack of a small body of larger spines at the entrance of the ductus seminalis. The rather mottled external appearance would support this. However knowledge of the male genitalia would be necessary for certainty.

**Holotype.** ♀, China, Qinghai, Menyuanxianmi, 2,800 m, 23–24. vii. 1992, coll. Xue Dayong, slide no L-3007 (ZCAS). **Paratype.** 1 ♀, data as holotype, slide no L-2767 (ZCAS).

***Eupithecia mediocincta* Mironov & Galsworthy, sp. nov. (Fig. 11)**

**Description.** Wingspan 19–21 mm; fore wing 10–11 mm. Fore wing costa slightly bowed; ground colour reddish brown; basal line curved from costa to inner margin close to body, area basad of line darker brown; antemedian line running outwards from costa to discal dot,



then acutely angled and running sharply basad and straight to inner margin; discal dot dark brown, triangular, formed of raised scales; median line running through discal dot and onwards as a wavy line to inner margin; postmedian line running outwards from costa, curving outside discal dot, and continuing almost straight to inner margin, area between antemedian and postmedian a darker brown, forming a clear transverse band across wing; terminal area unmarked except for a faint wavy pale submarginal line; terminal line brown. Fringes pale brown. Hind wing ground colour as fore wing; discal dot small and faint; postmedian well marked in brown, parallel to termen, area basad of it a darker brown.

Male genitalia (Fig. 24). Uncus rather long and stout, possibly biapical. Valve elongate, shaped like an orange segment, without ventral process; sacculus lightly sclerotized. Vinculum short and narrow, rounded. Papillae on the anterior arms of labides slightly elongate and thin. Aedeagus small and slim. Vesica armed with one U-shaped plate and a small irregular plate near base of ductus ejaculatorius. Sternite A8 with broadened base and two narrow apical rods; basal hollow shallow; apical hollow deep and narrow.

Female genitalia (Fig. 29). Bursa copulatrix small, pear-shaped, about 50 percent covered by small spines. Ductus bursae membranous, without spines. Ductus seminalis long, broad, curved around bursa copulatrix, attached to ductus bursae from right side. Colliculum small, short and narrow, tapered towards antrum. Antrum membranous. Tergite A8 square. Anterior and posterior apophyses short and thin, tapered to apices. Papillae anales relatively large and broad.

Range. Central China: Gansu and Sichuan provinces.

Similar species. This species is a relative of *Eupithecia subfuscata* (Haworth, 1809): it is somewhat similar to the Taiwanese *E. chui* Inoue, 1988, but differs from the latter by the contrast between the median fore wing fascia colour and the rest of the fore wing, and by the lack of contrast between the ground colour of hind wing and fore wing. The male and female genitalia are also similar to those of *E. chui*, but can be distinguished by the narrower base of the uncus and the different shape of the 8th sternite (with narrower base and deeper apical hollow) in the male, and by the absence of the large patch of spines in the ductus bursae in the female genitalia.

Holotype. ♂, [China], Gansu, Yongdeng, Tulugou, 2,280 m, 25–29. vii. 1991, coll. Xue Dayong, slide no L-2556 (ZCAS). Paratypes. 3 ♀, locality as holotype, 20–26. vii. 1991, slide no L-2751, 11–16. viii. 1991, and 24–29. iv. 1992, slide no L-2988, coll. Meng Feng; 1 ♂, locality as holotype, 2,270 m, 25–29. vii. 1991, coll. Xue Dayong, slide no L-3126; 1 ♀, [China], Sichuan, Nanping, Jiuzhaigou, 2,400 m, 7. ix. 1983, coll. Chai Huaicheng, slide no L-2903 (all ZCAS); 1 ♀, [China], Tapaishan im Tsinling [Dabaishan], South Shaanxi, ca 1,700 m, 7. viii. 1936, H. Höne, Vojnits slide no 12270 (ZFMK).

***Eupithecia tepida* Mironov & Galsworthy, sp. nov. (Fig. 12)**

Description. ♂. Wingspan 19 mm, fore wing 11 mm. Fore wing elongate, costa bowed beyond middle; ground colour pale fawn, transverse lines very faintly marked; antemedian regularly curved from costa to inner margin; discal dot small and faint; postmedian double, angled near costa; terminal area darker; terminal line brown. Fringes chequered brown and cream. Hind wing ground colour as fore wing; discal dot faint; postmedian running from anal margin to edge of cell; a faint submarginal line running parallel to termen; terminal line and fringes as fore wing.

Male genitalia (Fig. 25). Uncus medium sized, biapical. Valve shaped like an orange

segment, without ventral process; sacculus lightly sclerotized. Vinculum rather short and narrow. Papillae on anterior arms of labides short. Aedeagus slim, rather short. Vesica granulated and armed with one small U-shaped cornutus. Sternite A8 wedge-shaped, narrow, broadened to base; basal hollow very shallow; apical hollow absent.

Female unknown.

Range. Northwest China: Shaanxi province.

Similar species. On the basis of the male genitalia, especially the shapes of the valves and the single cornutus on the vesica, this species is similar to *Eupithecia subfuscata* (Haworth, 1809), but the shape of the 8th sternite distinguishes it.

Holotype. ♂, [China], Tapaishan im Tsinling [Dabaishan], South Shaanxi, ca 1,700 m, 19. viii. 1936, H. Höne, Vojnits slide no 12388 (ZFMK).

Remarks. The unique holotype male is in worn condition. Both valves are torn in the genitalia preparation.

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## 摘 要

中国のカバナミシヤク属 (2) (V. MIRONOV · A. C. GALSWORTHY · 薛 大勇)

前報に引き続き中国産カバナミシヤク属 *Eupithecia* の新種を記載した。今回記載した12種は次の通りである。 *E. andrasi* Mironov & Galsworthy (陝西), *E. levata* Mironov & Galsworthy (雲南), *E. omissa* Mironov & Galsworthy (陝西・甘肅), *E. testacea* Mironov & Galsworthy (雲南), *E. fenita* Mironov & Galsworthy (雲南), *E. burselongata* Mironov & Galsworthy (雲南), *E. minutula* Mironov & Galsworthy (雲南・チベット), *E. hainanensis* Mironov & Galsworthy (海南島), *E. molybdaena* Mironov & Galsworthy (陝西), *E. lamata* Mironov & Galsworthy (青海), *E. mediocincta* Mironov & Galsworthy (甘肅・四川), *E. tepida* Mironov & Galsworthy (陝西)。

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